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CALCULUS.

78. **Proposed by COOPER D. SCHMITT, A. M., Professor of Mathematics, University of Tennessee, Knoxville, Tenn.**

Investigate value $\left(\frac{\tan x}{x}\right)^{1/x^n}$ where x is 0 and n has consecutive values 1, 2, 3, 4, ... Is there any law governing the different results? When $n=1$, result is 1; when $n=2$, result is $e^{\frac{1}{3}}$; $n=3$, gives α, etc.

79. **Proposed by GEORGE LILLEY, Ph. D., Professor of Mathematics, University of Oregon, Eugene, Ore.**

Find the area included between $y=\sin^\pi x+\cos^\varepsilon x$; $y=\pi e(\sin^\pi x\cos^\varepsilon x)$ and the length of its boundary, true to six decimal places, when $\pi=3.14159$, $e=2.7182$.

⁂ Solutions of these problems should be sent to J. M. Colaw, not later than Sept. 10.

MECHANICS.

71. **Proposed by the late B. F. BURLESON, Oneida Castle, N. Y.**

Three men own a sphere of gold the density of which varies as the square of the distance from the center. If two segments be cut off each one inch from the center of the sphere it will be divided into three parts of equal value. Determine the diameter of the sphere.

72. **Proposed by REV. A. L. GRIDLEY, Pastor of First Congregational Church, Kidder, Mo.**

Prove that the motion of a ball falling through the earth influenced by gravity alone would be similar to the motion of a pendulum.

⁂ Solutions of these problems should be sent to B. F. Finkel, not later than Sept. 10.

DIOPHANTINE ANALYSIS.

71. **Proposed by A. H. BELL, Hillsboro, Ill.**

Find five numbers such that the product of any two plus 1 will equal a square.

72. **Proposed by H. C. WILKES, Skull Run, W. Va.**

Given $x^2+y^2+z^2=p^2+q^2+r^2$, to find unequal integral values for x, y, z, p, q, and r.

73. **Proposed by M. A. GRUBER, A. M., War Department, Washington, D. C.**

Find integral values for x and y in $\begin{pmatrix} 2x^2-y^2=\square, \\ 2y^2-x^2=\square, \end{pmatrix}$

⁂ Solutions of these problems should be sent to J. M. Colaw, not later than Sept. 10.